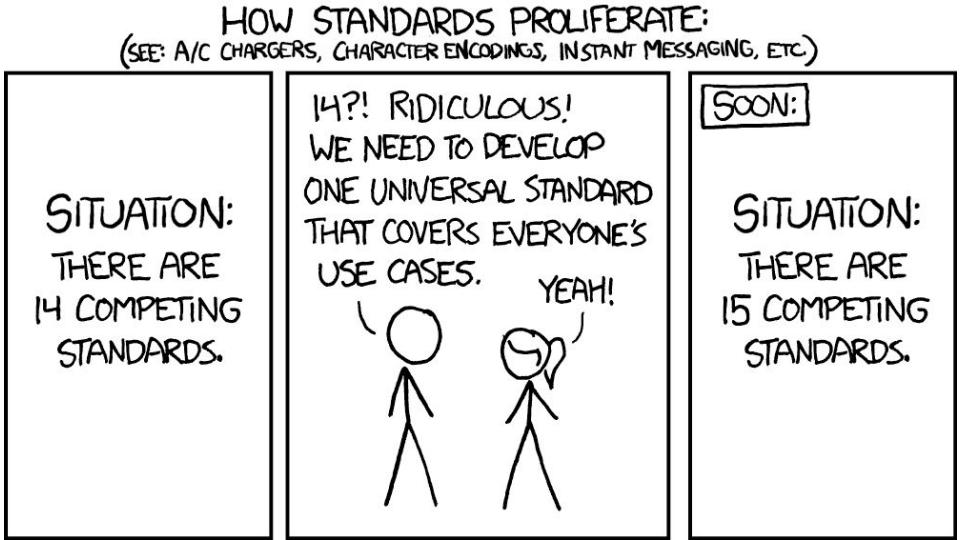
File Transfer Protocol

Build I.T. Club
November 4, 2026

file transfer protocols

- Want to get something from one computer to another? This is the motivation for file transfer protocols!
- Many protocols for different use cases are broadly classifiable as file transfer protocols:
  - HTTP/S
  - BitTorrent
  - NFS
  - rsync
  - FTP + variants!

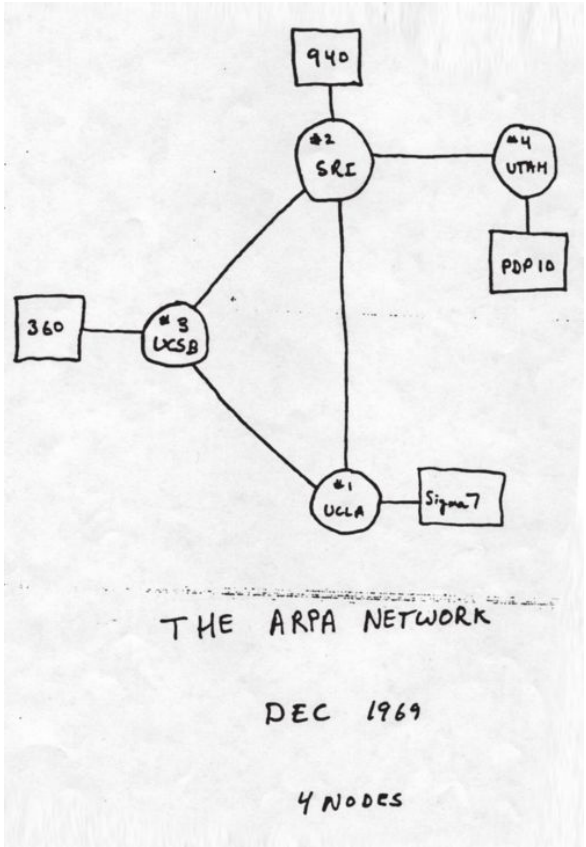


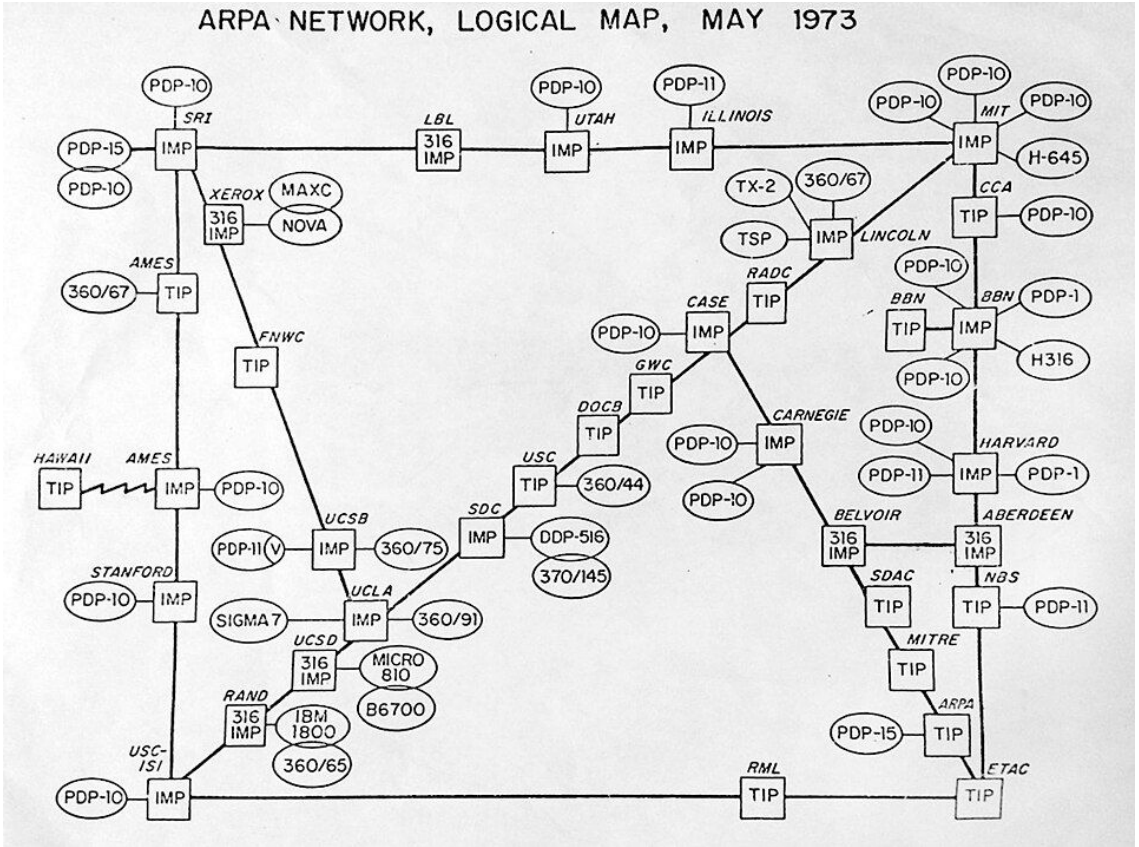
FTP – History

- FTP has been around since 1971, before TCP/IP (Internet protocol suite) and almost two decades before the World Wide Web
- FTP was introduced in 1971 for use on the ARPANET (DoD project, first packet-switched WAN; ARPANET is what we have to credit for the modern internet)
- Original RFC (Request for Comments) standard: https://www.rfc-editor.org/info/rfc172/

https://en.wikipedia.org/wiki/ARPANET

ARPANET topology





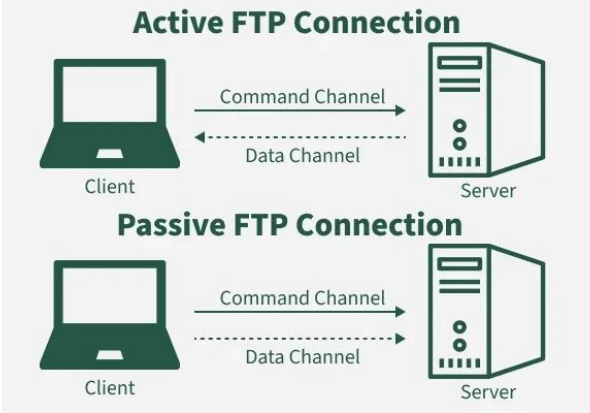
FTP – what & how

1. client contacts server on port 21 and authenticates (command channel)
2. client browses, requests file transfer with FTP commands
3. data is transferred from server (data channel)
4. data channel closes
   - Passive (default, client initiates, random high port) vs. active (server initiates, sends data from port 20)

https://www.geeksforgeeks.org/computer-science-fundamentals/file-transfer-protocol-ftp/

https://www.geeksforgeeks.org/linux-unix/setup-and-configure-an-ftp-server-in-linux/***

https://www.box.com/en-gb/resources/what-is-ftp



FTP vs. SFTP vs. FTPS

- SFTP (SSH File Transfer Protocol): Not the same protocol as FTP; runs inside SSH, routing everything through port 22
- FTPS (FTP over SSL/TLS): FTP with encryption; requires certificate generation and a more advanced client than built-in ftp
- SSH port forwarding plain FTP is also possible, but it’s difficult to configure. SFTP is much nicer and has the advantages of SSH so this is not really done

https://docs.ssh.com/manuals/client-user/44/Forwarding_FTP.html

demo – install packages

Word of warning: In this demo, we will be using plain (unencrypted) FTP. You should pretty much never do this unless you're on an isolated, trusted network – all your traffic (including authentication information!) is unencrypted and vulnerable to packet sniffing.

We will act as both FTP servers and clients for this demo.

```
sudo apt install vsftpd ftp vim
```

demo – set write configuration

```
sudo vim /etc/vsftpd.conf
```

- uncomment “write_enable=YES”. remember i for insert mode, esc for normal mode, :wq to write and quit

```
sudo systemctl restart vsftpd
```

Now FTP clients can authenticate as users! But if you’re actually hosting an FTP server (and especially if you enable anonymous access), you might not want them to be able to read or write everything on your filesystem…

Let’s restrict access to clients before actually using FTP!

demo – set up sharing dir. & chroot jail

`mkdir ~/ftp_files` - will be accessible to clients

`sudo vim /etc/vsftpd.conf`

Add these three lines:

```
chroot_local_user=YES
local_root=/home/itclub/ftp_files
allow_writeable_chroot=YES
```

chroot changes the apparent root directory; this modified environment is called a chroot jail. save and exit.

demo – access the FTP server

`sudo systemctl restart vsftpd`

`vim ~/ftp_files/server_document.txt` (add text)

`vim ~/localhost_document.txt` (add text)

`ftp localhost` (authenticate as itclub; ‘anonymous’ + email address as password if anonymous FTP was enabled)

Check what you can see with `ls` and your working directory with `pwd` – this is the chroot jail!

FTP doesn’t really drop you in a unix shell, but the available commands are quite similar.

https://www.cs.colostate.edu/helpdocs/ftp.html

demo – get & put

From the FTP prompt:

`get server_document.txt` (downloads the file to your current local directory)

`put localhost_document.txt` (uploads the file from your current local directory)

`bye`

Check what you have in your local directory and in ftp_files (playing the role of the remote computer)!

demo – real-world test-drive

FTP clients used to be integrated with web browsers. FTP servers are also becoming rarer, so we have to be a little more dedicated, but there's still a lot to explore!

COMPETITION

First one to get the welcome message from the scene.org FTP server (ftp.scene.org) and report the date contained therein wins.

https://en.wikipedia.org/wiki/Demoscene

supplemental – SFTP

The ftp package includes an installation of sftp. While, as discussed earlier, SFTP is not the same protocol as FTP, the usage is very similar.

chroot jailing can be done by configuring SSH settings and write permissions are simply set by user permissions.

Try creating a new file in your ftp_files directory and getting it with SFTP!

remember to delete your eduroam connection :)